sented by Mrs. Mathews; a Common Kestrel (*Tinnunculus alaudarius*), European, presented by Mr. W. W. Hughes; a Rough-legged Buzzard (*Archibuteo lagopus*), European, presented by Lady Bunbury; a Passerine Owl (*Glaucidium passerinum*), European, presented by Mr. T. W. Evans; a Burrhel Wild Sheep (*Ovis burrhel*) from India; a Suricate (*Suricata zenik*) from South Africa; two Beautiful Parrakeets (*Psephotus pulcherrimus*) from Australia, deposited; a Common Rattlesnake (*Crotalus durissus*) from North America, purchased.

SCIENTIFIC SERIALS

American Journal of Science and Arts, February.—Astronomical observations on the atmosphere of the Rocky Mountains made at elevations of from 4,500 to 11,000 feet, in Utah and Wyoming Territories and Colorado, by Prof. Draper.—On dinitroparadibrombenzols, and their derivatives, by Dr. Austen (second paper).—On the orbit of the planet Urda (167), by C. H. F. Peters.—Principles of compensation in chronometers, by J. K. James, M.D.—Notes on the Vespertine strata of Virginia and West Virginia (concluded), by W. M. Fontaine.—On the chemical composition of the flesh of *Hippoglossus americanus*, by R. H. Chittenden.—Notice of Darwin on the effects of cross- and self-fertilisation in the vegetable kingdom, by Asa Gray.—Note on *Microdiscus speciosus*, by S. W. Ford.—On water-courses upon Long Island, by Elias Lewis, jun.

Poggendorff's Annalen der Physik und Chemie, No. 12, 1876.—The ball supported on a jet of water, by M. Hagenbach.—On fluorescence, by M. Lommel.—Electromagnetic properties of unclosed electric currents (concluded), by M. Schiller.—The thermomultiplier as a meteorological instrument, by M. Buff.—On the temperature of the electrodes in induction sparks, by M. Herwig.—On an analogy of chromoxide to the oxides of the cerite metals, by M. Wernicke.—On the theory of condensers, by M. Aron.—On the ratio of cross-contraction to longitudinal dilatation in caoutchouc, by M. Röntgen.—On electrical figures in solid insulators, by M. Holtz.—On the work to be done in evacuation of a given space, by M. Koláçek.—Contributions to history of natural sciences among the Arabians, by M. Wiedemann.—A historical note on Daniel Bernouilli's gas theory, by M. Berthold. [With this number is issued No. 1 of the *Beiblätter*. It contains twenty-five abstracts of various physical researches that have recently been published.]

THE *Naturforscher* (December, 1876) contains the following papers of interest:—On the action of capillary tubes upon mercury, by E. Villari.—On the influence of water upon the temperature of the soil, by E. Wollny.—On boron, by W. Hampe.—On the determination of the vapour-density of substances having a high boiling-point, by V. Meyer.—On the polarisation of carbon electrodes, by H. Dufour.—On the relation of the organ of sight to the absence or presence of light, by Herr Joseph.—On the age of cells and the protoplasma currents, by Herr v. Vesque Püttlingen.—On symbiotism (the cohabiting of different species of plants), by A. B. Frank.—On the periodic change in the colour of *α* Ursæ Majoris, by H. J. Klein.—On the dependence of the respiration of plants upon temperature, by Adolf Meyer.—On the frequency of shooting-stars, by J. F. Schmidt.—On the influence of surrounding temperatures upon the circulation of matter in warm-blooded animals, by G. Colasanti.

FROM the *Verhandlungen des naturhistorischen Vereins der preussischen Rheinlande und Westfalens* (32 Jahrg., Part 2) we note the following papers:—Section for geography, geology, mineralogy, and palæontology: on the meteorites of the Natural History Museum of the University of Bonn, by Prof. vom Rath.—On the theoretical conclusions drawn from some observations made in a shaft of 4,000 feet depth at Sperenberg, by Prof. von Lasaulx.—On some fossils from the Neanderthal, by Prof. Schaaffhausen.—On the late volcanic eruption in Iceland and the ashes fallen in Sweden, by Prof. vom Rath.—On the cause of the ice-period, by Dr. Mohr.—On the occurrence of olivine in basalt, by Dr. Mohr.—On the most recent eruptions on the Island of Vulcano and their products, by Prof. vom Rath.—On the systems of volcanic crevasses in Iceland, by Dr. Gurlt.—On an investigation of Westphalian caves, by Prof. Schaaffhausen.—On the occurrence of rock salt in the Keuper formation near Hänigsen, by Dr. Gurlt.—On remains of *Vertebrata* from gravel deposits near Porta (Westphalia), by Herr Banning.—On fulgurites, by Herr v. d. Marck.—On fossil fishes from Sumatra and from Rinckhore, near Senderhorst, by the same.—On the thermal sources of Oynhausen, by Herr Graeff.—On the origin of and changes in Downs, with special reference to those of the German coasts of the North Sea, by Herr Borggreve.—On the geology of Eastern Transylvania, by Prof. vom Rath. Botanical Section: On dichogamy and the conditions regulating the production of blossoms in plants which bear fruit periodically, by Herr Borggreve.—On the formation of the primordial tube, by Herr Pfeffer.—On the production of high hydrostatical pressure through endosmotic action, by the same.—On the fruit of *Hura crepitans*, by Herr Andrac. Section for Anthropology, Geology, and Anatomy: On the palates of *Ptenoglossa*, by Prof. Troschel—On a luminous beetle of the *Physodora* family from Java, by Herr Moknike.—On the fertilisation of the ova of *Araneida*, by Herr Bertkau.—On a stone sarcophagus found near Sechtem (on the Cologne-Bonn railway), containing well-preserved red hair of reddish tint, by Prof. Schaaffhausen.—On the various views of different naturalists on the reproduction of eels, by Prof. Troschel.—On the so-called *Cribellum* of L. Koch, by Herr Bertkau.—On some rare and remarkable *Arachnida* of the Rhenish fauna, by the same.—On stone implements and other objects found in the Klusenstein and Martin's Caves, by Prof. Schaaffhausen. Section for Chemistry, Technology, Physics, and Astronomy: On the separation of ethyl-bases by means of oxalic ether, by Prof. Wallach.—On converting amides into bromides, by V. von Richter.—On indium, by the same.—On some experiments with hydrobenzoines, by Herr Zincke.—On an apparatus for measuring very small fractions of time, by Herr Gieseler.—On a new electro-dynamical law, by Prof. Clausius. Physiological Section: On the functions of the spinal cord, by Dr. Frensberg.—On the structure of the tissues of blood-vessels and the inflammation of veins, by Herr Köster.—On santonine poisoning, by Herr Binz.—On the influence of salicylic acid upon the bones, by Herr Koster. The remaining papers are of purely medical interest.

Reale Istituto Lombardo di Scienze e Lettere. Rendiconti, December 28, 1876.—On some differential equations with algebraic integral, by M. Brioschi.—On the electric theory of the radiometer, by M. Ferrini.—On the anti-fermentative action of boric acid, and its application in therapeutics, by M. Polli.—On the *sclerotium oryzæ*, a new vegetable parasite which has devastated many rice-fields of Lombardy and the Novarese during the past year, by M. Cattaneo.—Mildella, a new genus, type of new tribes of Polypodiaceæ.—Graeco-Indian studies, by M. Cantor. Relating to geometry, algebra, astronomy; &c.

Morphologisches Jahrbuch, vol. ii. part 3.—On the structure of the skin and dermal sense-organs of Urodela (Proteus, Menopoma, Cryptobranchus, Salamandra, Triton, Salamandrina), by F. Leydig, four plates.—On the metamorphosis of Echiurus, by W. Salensky, four stages figured.—On the exoskeleton of fishes, by O. Hertwig. Part 1, sixty-eight pages, six plates, relating to Siluroids and Accipenseroids. The placoid scales of Selachians, the dermal teeth of Siluroids, and the dermal scutes of Accipenseroids are shown to be homologous.—Contribution to the morphology of the limbs of vertebrates, by Prof. Gegenbaur.—The most ancient form of the carpus and tarsus of Amphibia, by R. Wiedersheim.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, February 8.—"On the Transport of Solid and Liquid Particles in Sewer Gases." By E. Frankland, F.R.S.

The suspension of vast aggregate quantities of solid and liquid particles in our atmosphere is the subject of daily remark. Cloud, fog, and smoke consist of such particles, and I have repeatedly seen at a distance of a few feet abundance of snow-crystals floating in the air, when the atmosphere was apparently perfectly clear and cloudless by placing the eye in shadow and then looking into the sunshine.

Prof. Tyndall has, I conceive, proved that a very large proportion of the suspended particles in the London atmosphere consists of water and other volatile liquid or solid matter by showing that the heat of boiling water is sufficient to dissipate them. That this is the true explanation of the disappearance of such particles by the application of a moderate degree of heat, and that it is not caused by the rarefied air from the heated body ascending and leaving behind the suspended matter, as suggested by Tyndall is, I think, conclusively proved by experiments in which

I found that suspended particles of sal ammoniac subsided in an atmosphere of hydrogen scarcely twice as fast as in atmospheric air.

Thus an atmosphere fourteen times as rare as that of London (and, as Prof. Stokes remarked, possessing only half the viscosity of air), still offers sufficient resistance to the subsidence of minute suspended particles to prevent them from falling more rapidly than one inch per minute. Such particles could not therefore be left behind by an ascending current of the slightly rarefied but more viscous air produced by an increase of temperature to 100° C.

In addition to these aqueous and other volatile particles which disappear by a gentle heat, there are also others which consist partly of organic and partly of mineral matters. But the organic seem greatly to preponderate in the air of towns, because such air becomes *apparently* perfectly clear after it has been ignited.

The processes of fermentation, putrefaction, and decay afford abundant evidence that zymotic and other living germs are present amongst the organic portion of the suspended matters, whilst many analyses of rain-water, made by myself and others, show that the salts of sea-water are amongst the mineral constituents floating in the atmosphere.

Of the zymotic matters, those which produce disease in man are obviously of the greatest importance. The outbreak of Asiatic cholera in Southampton in the year 1866, for instance, was traced by the late Prof. Parkes, F.R.S., to the dispersion of infected sewage through the air. The sewage became infected by the intestinal discharges from some cholera patients who landed from the Peninsular and Oriental Company's steamship *Poonah*.

In this case the dispersion was produced by the pumping of the infected sewage and its discharge, in a frothy condition, down an open channel eight or nine feet long. The effluvium disengaged from this seething stream was described as overpowering, and was bitterly complained of by the inhabitants of the adjacent clean and airy houses, amongst whom a virulent epidemic of Asiatic cholera broke out a few days after the sewage received the infected dejections. Nevertheless the discharge of the frothy liquid was kept up day and night for about a fortnight, and 107 persons perished. At length a closed iron pipe was substituted for the open conduit; from that day the number of cholera cases diminished, and within a week of the protection of the conduit the epidemic was virtually over.

In this example a potent cause of the suspension of the zymotic poison in the air was obvious, but in the many alleged instances of the propagation of typhoid fever by sewer gases, the condition of dispersion is not so evident. Does the flow of sewage in a properly constructed sewer produce sufficient agitation to disperse liquid particles through the air-space of the sewer? I endeavoured to answer this question by violently agitating a solution of lithic chloride in a glass cylinder three inches in diameter and thirty inches high, with a wooden rod, and ascertaining whether the atmosphere at the mouth of the cylinder became impregnated with the liquid, by testing it with the flame of a Bunsen burner; but no trace of lithium could be detected at the mouth of the jar, even after an agitation much in excess of what would ordinarily occur in a sewer.

There is, however, another kind of agitation to which sewage is subject that may produce a very different result—I allude to the development of gases during the processes of fermentation and putrefaction. It is well known that the bursting of minute bubbles of gas at the surface of an effervescing liquid causes the projection of visible liquid particles into the air to the height of several inches. Such visible particles are seen to fall back again immediately into the liquid; but it appeared to me not unlikely that other particles, too minute to be seen, might be simultaneously projected, and by reason of the smallness of their masses in relation to their sectional areas, might continue suspended in the air for a long time. To ascertain the fallacy or truth of this notion I made the following experiment:—

A quantity of a strong solution of lithic chloride was placed in a shallow basin and acidulated with hydrochloric acid; fragments of white marble were then added, and a paper tube five inches in diameter and five feet high was placed vertically above the basin. So long as the effervescence continued, abundance of particles of lithium were visible in a Bunsen flame held at the upper end of the tube. A tinplate tube three inches in diameter and twelve feet long was now placed in such a position as to bring one of its open ends over the top of the paper tube. The tin tube was nearly horizontal but slightly inclined upwards from the paper tube, so as to cause a gentle draught of air to pass through it, when it was slightly heated externally near its lower extremity. A Bunsen flame placed at the end of this tube furthest away from the effervescing liquid, showed that the suspended particles of solution of lithic chloride were not perceptibly less numerous than at the mouth of the paper tube; neither were they much diminished at the further end of the tin tube when the height of the paper tube was increased to nine and a half feet. There can, I think, be little doubt that these particles, which had thus been carried along by a gentle current of air for a distance of twenty-one feet, would be similarly conveyed to very much greater distances.

The following conclusions as to the behaviour of flowing sewage may be drawn from these experiments:—

1. The moderate agitation of a liquid does not cause the suspension of liquid particles capable of transport by the circumambient air, and therefore the flow of fresh sewage through a properly constructed sewer is not likely to be attended by the suspension of zymotic matters in the air of the sewer.

2. The breaking of minute gas-bubbles on the surface of a liquid consequent upon the generation of gas within the body of the liquid is a potent cause of the suspension of transportable liquid particles in the surrounding air, and therefore when, through the stagnation of sewage or constructive defects which allow of the retention of excrementitious matters for several days in the sewer, putrefaction sets in and causes the generation of gases, the suspension of zymotic matters in the air of the sewer is extremely likely to occur.

3. It is therefore of the greatest importance to the health of towns, villages, and even isolated houses, that foul liquids should pass freely and quickly through sewers and drain-pipes, so as to secure their discharge from the sewerage system before putrefaction sets in.

Linnean Society, February 1.—Mr. G. Bentham, F.R.S., vice-president, in the chair.—Messrs. G. Boulger, Alfred S. Heath, and William Meller, were elected Fellows of the Society. —Mr. A. W. Bennett exhibited, and made remarks on, certain specimens of insects illustrating mimicry; these had been captured in Syria by Mr. N. Godman.—An unusual form of double anemone, and some excessively large oak-leaves gathered near Croydon, were shown by Mr. S. Stevens, and they evoked discussion from the Chairman and other Fellows present.—Sir John Lubbock then proceeded with Part 4 of his contributions on the habits of ants, bees, and wasps. In this communication he illustrated by ingenious experiments his *modus operandi* of testing their faculties, dispositions, habits, &c., by something of a double F apparatus (Fꟻ), whereby an interval of three-tenths of an inch, either by a drop from above or reaching upwards the distance from below, alone prevented ants from gaining access to a covered glass cell filled with larvæ. They evidently had not the acumen to surmount the three-tenths of open space, although they had for hours before been traversing the route and carrying off larvæ previous to the small gap being made. Industry was conspicuously shown by one specimen, which Sir John used to place in solitary confinement in a bottle for hours, and once for days, but the moment released it commenced its laborious larvæ-gathering propensities. It seems, from other experiments, that ants in difficulties within sight of their companions are by no means always assisted or relieved, other attractions, food and such like, possessing greater interest for them. On putting some specimens under the influence of chloroform, little or no notice was taken of those insensible by their companions, the tendency apparently being to let friends lie and throw over the edge of the board strangers thus chloroformed. It seems that to get ants properly intoxicated with spirit for experimental purposes is no easy matter, some recovering too quickly, and others remaining so thoroughly dead drunk as to come under the rank of impracticables; while between reeling friends and strangers the experimenter finds himself baffled. The sober ants are exceedingly puzzled at finding their friends in such a condition. As a general rule they picked up drunken friends and carried them to the nest, whilst they threw into the water and drowned strangers. In some instances confusion arose, for a few of the strangers were carried to the nest and friends tumbled into the water, but they did not return to the rescue of the friends, though strangers were afterwards expelled from the nest. Sir John expresses surprise that ants of one nest perfectly well know each other. Even after a year's separation old companions are recognised and amicably received, whereas strangers, particularly among the *Lasius flavus*, are almost invariably attacked and maltreated, even when introduced in the mixed company of old friends. Sight cannot be acute; for example, in experiments food was placed on a glass slip a few inches from the nest, the straight road to and from the nest being soon familiar to the ants; but when the food had been shifted only a short distance from its first position it was long ere it was discovered. Indeed they wandered from a few minutes to half an hour in the most extraordinary circuitous routes before finding out the direct road between the nest and food, and *vice versâ*. Slavery in certain genera is a positive institution, the Amazon ants (*Polyergus rufescens*) absolutely requiring slave assistants to clean, to dress, and to feed them, else they will rather die than help themselves, though food be close at hand. A curious blind woodlouse (*Platyarthrus hoffmansegii*) is allowed house room by the ants, it acts as a kind of scavenger, the ants taking little notice of the woodlice, and even migrate leaving them behind. Some new species of Diptera of the family Phoridæ he finds to be parasitic on our house ants; and Mr. Vernal has recently described these interesting forms.—A paper on the aspects of the vegetation of Rodriguez was read by Mr. I. Bailey Balfour, who accompanied as botanist the Transit of Venus Expedition in 1874. It seems that, like the flora of St. Helena, that of Rodriguez has undergone great changes, partly by human and other agencies. It is insular, dry, and temperate rather than humid, and tropical in character. The facies is predominantly Asiatic, though forms of Mascarene type, and even Polynesian and American forms, are sparsely met with. The leaves of many plants Mr. Balfour observed exhibited heteromorphism of a marked kind, and this be described with some fulness, remarking that while as a whole in degree and kind variable, yet among species the leaf variation is pretty uniform.—The fungi of the *Challenger* Expedition (third notice), by the Rev. M. J. Berkeley, and on Steere's collection of tropical ferns, by Prof. Harrington, U.S., were papers announced and taken as read.

Zoological Society, February 20.—Prof. Flower, F.R.S., vice-president, in the chair.—Mr. Osbert Salvin, F.R.S., exhibited a series of drawings taken during Hunter's voyage to Australia in 1788–92, wherein Duke of York Island as it then existed was depicted, together with various objects of natural history.—A communication was read from Prof. Owen, C.B., containing an account of some additional evidence recently obtained of the former existence of extinct birds allied to the genus *Dromornis* in Australia.—Mr. Sclater read a paper on the birds collected by the Rev. George Brown on Duke of York Island and on the adjoining parts of New Ireland and New Britain. Eleven species were described as new to science, amongst which were a new Kingfisher proposed to be called *Tanysiptera nigriceps*, and a new Pigeon to which the name of *Macropygia browni* was assigned.—Dr. G. E. Dobson read a paper on a collection of Bats collected by the Rev. George Brown in Duke of York Island and the adjacent parts of New Ireland and New Britain. Amongst these four were considered to belong to undescribed species, and one of these to a new genus of the Frugivorous Bats, proposed to be called *Melonycteris*.—Mr. Edward R. Alston read a paper on the Rodents and Marsupials collected by the Rev. G. Brown in Duke of York Island, New Britain, and New Ireland. The species, six in number, were either identical with New Guinea forms or nearly allied. For the three new species the names of *Mus browni*, *Uromys rufescens*, and *Macropus lugens* were proposed.—Messrs. O. Salvin and F. Du Cane Godman read the descriptions of a collection of Lepidoptera made by the Rev. George Brown on Duke of York Island and its neighbourhood. The series of Butterflies contained twenty-six genera and forty species, while in that of the Moths eleven genera were represented by fourteen species.—Mr. E. J. Miers read a description of the Crustacea collected by the Rev. G. Brown on Duke of York Island. The collection, with one exception (*Lysiosquilla arenaria*), belonged to the Decapoda, and contained in all forty-four specimens representing sixteen species. Although none of the species were new to science, several were interesting and little-known forms.—Dr. A. Günther, F.R.S., read a paper on a collection of Reptiles and Fishes made by the Rev. George Brown on Duke of York Island, New Ireland, and New Britain. Of nine lizards represented in the collection one was described as new, and of eleven snakes three were considered to be hitherto unknown. Amongst the latter was a new genus and species of Erycidæ, proposed to be called *Erebophis asper*.—Mr. H. W. Bates read a paper on the Coleoptera collected by Mr. George Brown on Duke of York Island, New Ireland, and New Britain. The collection comprised forty-four species, and contained some of the finest species of the New Guinea Fauna. Amongst these were many examples of a new Longicorn, proposed to be called *Batocera browni*, after its discoverer.

Geological Society, February 7.—Prof. P. Martin Duncan, F.R.S., president, in the chair.—James Durham, Herbert William Harrison, William Hutchinson, H. M. Klaassen, Graeme Ogilvie, Joseph William Spencer, and Griffin W. Vyse were elected Fellows of the Society.—The following communications were read:—On the chemical and mineralogical changes which have taken place in certain eruptive rocks of North Wales, by John Arthur Phillips, F.G.S. In this paper the author described the felspathic rock of Penmaenmawr, which has been erupted through Silurian strata, and rises to a height of 1,553 feet above the level of the sea. The rock, which is composed of crystalline felspar with minute crystals of some hornblendic mineral, is fine-grained and greenish grey, divided into beds by joints dipping north at an angle of about 45°, and again divided by double jointings, sometimes so developed as to render the rock distinctly columnar. At the eastern end of the mountain the stone is so close in texture as often almost to resemble chert. In the next two quarries westward the rock is coarser, and its jointing less regular. In the most westerly quarry the stone is generally fresher in appearance, closer in grain, and greener in colour. All these stones are probably modifications of the same original rock. From the chemical analysis of the rocks the author concludes that, supposing them all to have had originally the same composition as the unaltered rock in the most westerly quarry, that at the extreme east of the mountain has lost about 3 per cent. of silica, and the others have received respectively an increase of 1·35 and 0·77 per cent. of silica.—On a new species of *Belemnites* and *Salenia* from the Middle Tertiaries of South Australia," by Ralph Tate, F.G.S., Professor of Natural Science in the University of Adelaide. The author noticed the occurrence in deposits of supposed Miocene age in South Australia of a species of Belemnite (*Belemnites senescens*) and a *Salenia* (*S. tertiaria*). These fossils were obtained from Aldenga, twenty-six miles south of Adelaide, on the east coast of St. Vincent's Gulf, where the long series of sea-cliffs contains an assemblage of fossils identical with that of the Murray River beds. The *Salenia* is especially interesting on account of the discovery of a living species of the genus by the naturalists of the *Challenger*.—On *Mauisaurus gardneri* (Seeley), an Elasmosaurian from the base of the gault at Folkstone, by Harry Govier Seeley, F.L.S., F.G.S., Professor of Geography at King's College, London. The author described the skeleton of a great long-necked Saurian obtained by Mr. J. S. Gardner from the Gault of the cliff at Folkestone. The remains obtained included a tooth, a long series of vertebræ, some ribs, bones of the pectoral arch, the femur, and some phalanges, indicating a very large species, which the author referred, with some doubt, to the genus *Mauisaurus* of Dr. Hector, founded upon a Saurian from the Cretaceous formation of New Zealand. He gave it the name of *Mauisaurus gardneri* in honour of its discoverer. A small heap of pebbles was found in the neighbourhood of the ribs, and it was supposed that these had been contained in the stomach of the animal.

Anthropological Institute, February 13.—Mr. John Evans, F.R.S., president, in the chair.—Miss Buckland read a paper on primitive agriculture, in which the value of the study of the subject was explained, as determining migrations, &c., of nations in pre-historic times. It was observed that agriculture could only have been practised by peoples having settled habitats, and was probably carried on then, as often is the case now, by women; that agriculture was and is still unknown to some of the lower races who confine themselves to the cultivation of indigenous roots and fruits, whilst the higher races cultivated the cereals. The origin of the cereals is still obscure, and maize, which has been considered indigenous to the New World, and unknown in Europe before the time of Columbus, was, in the opinion of Miss Buckland (based on the reports of recent travellers in Africa, Madagascar, New Guinea, China, &c.), cultivated by peoples which have never had intercourse with Europeans. In America, China, and Ancient Egypt there are traces of a time anterior to that of the cultivation of the cereals; and a similarity of myths, customs, &c., of China, Egypt, Peru, and Mexico leads to the conclusion that an allied pre-Aryan race introduced cereals into all these countries. In the discussion, Mr. Boyd Dawkins, the president, and others took part.—Mr. H. Hyde Clarke exhibited some weapons from the Amazon River, on which Mr. Franks and others remarked.—Lord Rosehill exhibited a collection of very fine and large flint weapons, objects, &c., from Honduras.

The president, Mr. Blackmore, Mr. Franks, and others spoke on the subject.

Society of Telegraph Engineers, February 5.—Prof. Abel, F.R.S., in the chair.—The paper read was on shunts and their applications to electrometric and telegraphic purposes, by Mr. W. H. Preece. Having briefly explained the laws of shunts, Mr. Preece referred to the use of shunts for measuring purposes as well as to their early employment in practical telegraphy. The author entered minutely into the question of electro-magnetic induction, and gave the results of the experimental investigations on the "extra" current upon which he has been recently engaged. The "extra" current which is received from a simple coil of insulated copper wire being selected as the *unit*, it was shown that by the insertion of a core as well as by varying the quantity of iron in the armature, the strength of the "extra" current might be increased no less than 2,238 times. The means which should be adopted in order to counteract the prejudicial effects of the extra currents upon the speed of working were then described at length, and the employment of electro-magnetic shunts in order to compensate for the *static* induction which proves so troublesome on long lines was also fully gone into.

Medical Microscopical Society, January 19.—Annual General Meeting.—Dr. J. F. Payne, president, in the chair.—The secretary's report for the year 1876 was read.—Twelve papers on important subjects were read during the year, of which four were illustrative of new forms of instruments applicable to medical histology.—The number of members in December, 1876, was 129.—The retiring President (Dr. Payne) then delivered his address, in the course of which he remarked that the Society was passing through a crisis, having outgrown its developmental stage, and that its sphere of usefulness was to be found rather among medical practitioners than among students, for whom it was first intended. After pointing out the special function of the Society to be the study of histology in its relation to medical practice and public health, the speaker passed in review the work done during the past year by the members of the Society.

Victoria (Philosophical) Institute, February 19.—Dr. C. Brooke, F.R.S., in the chair.—Mr. Morshead read a paper on comparative psychology.

BOSTON

Natural History Society.—Mr. Hyatt's important contribution on the life-history of the groups of Ammonites (*Proceedings*, December, 1876) develops and applies in detail to the Stephanoceras group (of which *A. humphresianus* is an important member), his doctrines as to the period in life at which specific peculiarities appear. He endeavours to prove that the species of a group inherit the characteristics of their ancestors at earlier and earlier periods, until they become present even in the very young forms. He further brings forward evidence of the inheritance of old-age or senile characters which forebode the extinction of the group. Thus the successive species of almost all large groups sooner or later inherit the senile features of their ancestors, so as to reproduce them at early stages. Further, there is a broad similarity between the senile characters in different groups.

PARIS

Academy of Sciences, February 19.—M. Peligot in the chair.—The following papers were read:—Meridian observations of small planets, at the Greenwich and Paris Observatories, during the fourth trimestre of 1876; communicated by M. Le Verrier.—The human species, by M. de Quatrefages. An outline of the views published in his new work on the subject.—Remarks of M. Chevreul on a recent note of M. Radziszewski relative to phosphorescence of organic bodies.—Properties common to canals, to conduit pipes, and to rivers with uniform flow (continued), by M. Boileau.—MM. Dumas, Milne-Edwards and Boussingault were appointed a Commission to give an opinion on the matter of discussion between Dr. Bastian and M. Pasteur.—On the air-jet in water, by M. de Romilly. When a steady jet is sent normally against the surface, and the tube gradually withdrawn, there is found a distance at which a smooth pocket, deeper than broad, is made at the surface, showing often a slow rotation, and giving a sound, which is strengthened if the same note be played on the violin. When a jet is sent upwards from an orifice near the bottom of a vessel of water, a spherical air-chamber forms about and under the orifice, becoming the base of an ascending air-column, which base is more than triple the diameter of the orifice. The column suddenly contracts near the orifice, then gradually widens. The author describes some other effects.—On Kepler's problem, by M. de Gasparis.—On orthogonal systems comprising a family of surfaces of the second degree, by M. Darboux.—Memoir on the methods employed for determination of the curves of astronomical objectives, accompanied with tables for abridging the calculation, by M. Martin.—On a means of varying the focussing of a microscope without touching either the instrument, or the object, and without altering the direction of the line of vision, by M. Govi. This is based on the fact that the interposition between objective and object of a medium more refringent than air, with plane parallel sides at right-angles to the axis of the microscope, will cause an apparent elevation of the object represented by $d = e\frac{n-1}{n}$, where d is the elevation produced, e the thickness of the medium, and n its index of refraction relatively to air or vacuum. He uses a vessel of liquid with glass bottom and varies the height of the surface either with a plunger or a communicating vessel.—New process of photomicrography, by M. Fayel. The upper end of the microscope catches in a wooden frame on colonnettes, the aperture of this corresponding with that of a dark chamber which can be placed or removed at will. In this chamber is a moveable plano-convex lens, and through it an image equal to that seen by the eye is thrown on sensitised glass.—On the microscope and the dark chamber, by M. Neyreneuf. This gives some theoretical results from examination of Dr. Fayel's method.—On the manufacture of carbon conductors for the electric lamp, by M. Carré. He reminded the Academy of his own experiments. Moistening carbon-powder with syrups of gum, gelatine, &c., or fixed oils thickened with resins, he gets plastic and consistent pastes very suitable for making carbon points of. Even without other admixture, they give more light than the ordinary carbons, in the proportion of 1·25 to 1.—Study and determination of the principal colouring matters used to falsify wines, by M. Chanal.—On the action of alkaline sulphocyanates on chlorhydrates of alkalies of the fatty series, by M. De Clermont.—Action of electrolytic oxygen on glycol, by M. Renard.—On the discharge of the torpedo, studied with Lippmann's electrometer, by M. Marey. If the discharge of a torpedo, much weakened, be directed into the electrometer, the mercury moves in the positive direction, in a jerky way, progressing always more than it goes back. This shows a striking analogy to the phenomena of muscular contraction.—On the localisation of copper in the system, after ingestion of a salt of this metal, by M. Rabuteau. It would be rash to affirm poisoning with a salt of copper, because eight or even twelve centigrammes of the metal might be found in the liver. Salts of copper are less poisonous than hitherto supposed.—On the first development of a star-fish, by M. Fol.—On the hair of vine-shoots, applied to manufacture of paper, by M. Boutin.—On the reconcilement of moral liberty with scientific determinism, by M. Boussinesq.

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